ZEBRA
TECHNOLOGIES

A Zebra Technologies White Paper

Bar Code Printing from Oracle® WMS and MSCA

Executive Summary

Bar code output from the Oracle® E-Business Suite environment is traditionally accomplished through third-party software. However, Oracle's Warehouse Management System (WMS) and Mobile Supply Chain Applications (MSCA) offer an approach that can simplify bar code label printing. Oracle WMS and MSCA produce output in XML data streams, instead of a proprietary Oracle format. Zebra Technologies offers two solutions for bar code printing from Oracle WMS/MSCA: (1)The Zebra XML-Direct Connect method—where Zebra makes available via printer firmware an embedded XML parser in the XML-enabled printers, so output from Oracle WMS and MSCA is natively understood by the printer through a direct connect TCP/IP connection, and (2) Zebra's middleware ZebraLink™ Enterprise Connector Solution, which transforms the Oracle XML to pure ZPL® (Zebra Programming Language) right on the Unix/Linux Oracle Application server.

This white paper describes both the XML middleware and XML direct-connect bar code printing options for Oracle WMS and MSCA offered by Zebra Technologies, explains Oracle's output methods for each, and provides guidance as to when each approach is best suited to a particular environment.

Introduction

Bar codes are integral to warehouse and inventory control operations and are often used with Oracle WMS and MSCA. Oracle software includes 10 default pre-seeded label types for shipping, inventory movement and item identification processes. Additional formats are often required for compliance labeling, report printing and other applications. These labels are typically created with third-party label design applications that must integrate with the Oracle system.

Oracle's WMS and MSCA applications communicate print jobs natively in an XML data stream. To print bar codes, the XML print job data must be processed and encoded into a bar code format that a printer can understand. Traditionally, third-party software has been used to design label formats and manage output to the bar code label printer. The Oracle applications and system administrator handle all the steps in between, including management of user profiles and privileges; managing print requests, label format and printer selection; and generation of the XML data stream.

The print job is then communicated to a bar code printer over a TCP/IP network or other connection using either asynchronous, synchronous PL/SQL or synchronous TCP/IP communication.

In **asynchronous mode**, the Oracle application drops an XML file into a directory. A third-party application is responsible for monitoring the directory, processing the XML data, merging the data with the label format, and then routing it to the appropriate printer.

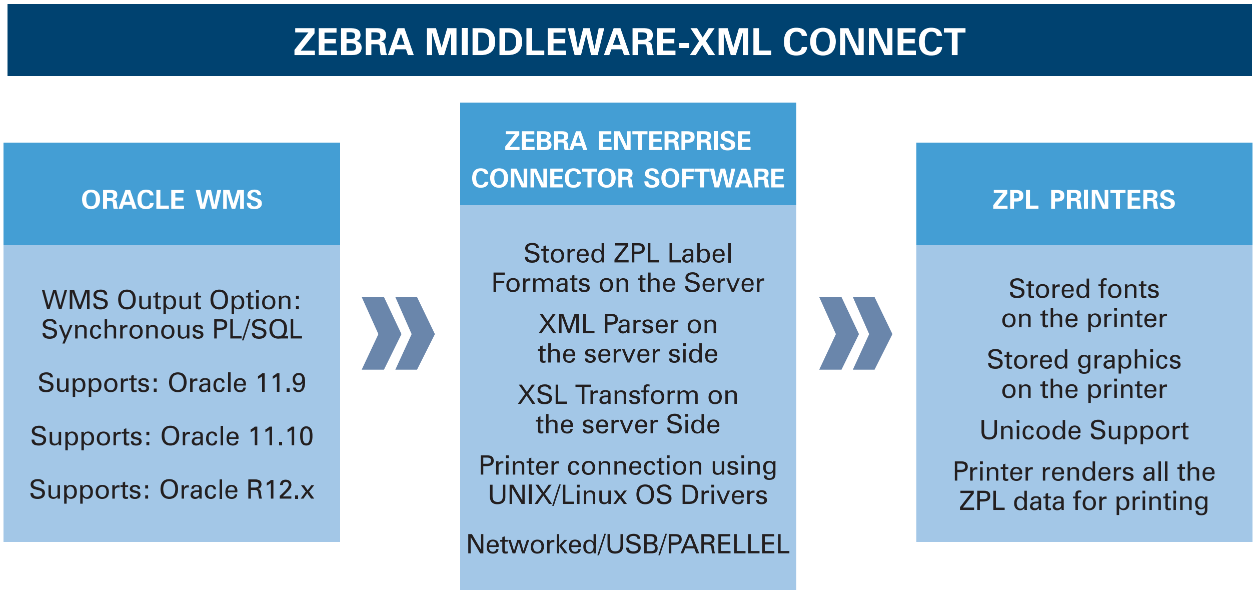
Synchronous PL/SQL mode is a simpler approach. It uses a PL/SQL application program interface (API) to integrate the Oracle application and the third-party application (or printer) in real time. Oracle WMS and MSCA use the PL/SQL API to make a call to the printer or third-party application, which then processes the incoming XML data stream for output. Oracle's synchronous communications architecture results in no files to transfer, eliminates cross-platform labeling issues and stores success or failure messages within the Oracle application.

Synchronous TCP/IP mode allows for a label request to be generated and processed immediately while the Oracle user waits for a TCP/IP connection to be successfully established. This is accomplished using standard TCP/IP socket communication, over an IP address and port number defined in WMS/MSCA. This integration mode has been available since the 11i10 release of Oracle WMS.

The printing process described above is roughly the same regardless of what form of output is used. Zebra middleware XML Enterprise Connector Solution and the Zebra XML direct-connect method differ by how the Oracle XML stream is processed and how printer communications are configured within Oracle. These approaches are described in the following sections.

Middleware

Middleware, which can take the form of label design software, print server applications, or document management software, is the most common method for generating bar code output from Oracle applications.

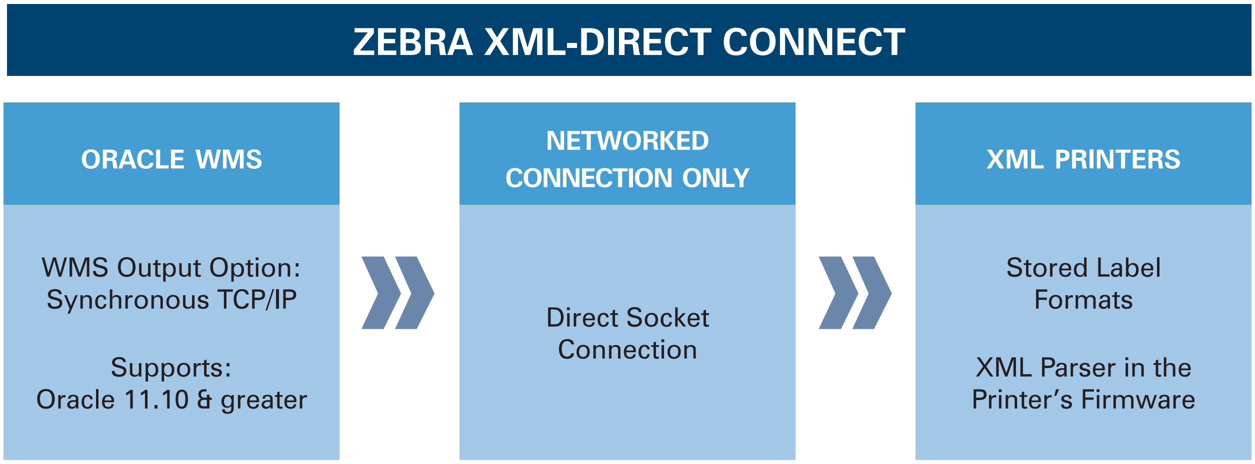


There are many bar code label design software packages, but few offer true, certified Oracle connectivity. In fact, Oracle has certified the ZebraLink Enterprise Connector software for Oracle eBusiness Suite, including Oracle WMS and MSCA.

The ZebraLink Enterprise Connector Middleware performs the XML conversion that enables Oracle data to be expressed in bar code and text on the label. Middleware can be used for synchronous PL/SQL printing from Oracle WMS and MSCA, where the Oracle applications route the print request and output destination through the ZebraLink Enterprise Connector that resides on UNIX/LINUX base Oracle Application Server. The ZebraLink Enterprise Connector application processes the XML data streams, generates the bar code, populates the label fields and sends the ZPL print job to the designated printer over a USB, parallel, wired or wireless network connection. This single, central ZebraLink Enterprise Connector application can manage all enterprise bar code printing requirements within a facility, provided there is network access to remote locations. The ZebraLink Enterprise Connector approach may also direct all enterprise bar code printing operations in a distributed environment by using wide-area network connections.

Zebra Direct-Connect

Zebra's XML-Direct Connect solution uses firmware on the Zebra® bar code label printer and synchronous TCP/IP mode communication with Oracle WMS and MSCA to process the Oracle XML data stream. Here is how it works.



An event in the Oracle business process triggers a request for a bar code label. The request may be generated automatically as part of the business rules, or may be requested by the Oracle user.

Bar code label requests are forwarded to the Oracle application, where rules and profiles verify that the user is authorized to access the information and produce the desired label. The profile also directs the label output to a specific Zebra printer associated with the user.

The Oracle application then makes procedure calls in Java® code to access the information needed to produce the label. The label request and required data are formatted into a native XML message for synchronous communication. The print job is transmitted to the Zebra printer via TCP/IP between the Oracle application and the printer.

Zebra's XML-enabled printers understand the native XML data streams that Oracle WMS and MSCA produce. The incoming XML message includes a header that specifies the required label format name and label quantity, and the rest of the data stream specifies the variable field data. Printer firmware processes the incoming XML data stream, calls up the label format, and populates it with the variable data from the XML message.

The printer then outputs the bar code label. All the different label formats required to support Oracle business processes can be stored directly in printer memory.

Application Requirements

The host application, Zebra printer, and label formats must all be enabled to support direct connection and label printing. The requirements for each component are outlined below.

Both solutions are currently available for the Oracle Warehouse Management System and Mobile Supply Chain Applications version 11i10 or higher. For Zebra XML-Direct Connect, Oracle is configured as synchronous TCP/IP communication. For the middleware ZebraLink Enterprise Connector, Oracle is configured as synchronous PL/SQL communication, where a PL/SQL script is used to process the procedure calls for Oracle. This small script requires one-time installation and manages the API for synchronous PL/SQL communications.

On the printer side, direct connection requires XML-enabled printers that operate on ZPL (Zebra Programming Language). Printer firmware determines which Zebra models can process Oracle XML data streams. Zebra offers XML printing capability on a wide range of high-performance, midrange, desktop, mobile and RFID printers, as well as print engines. For a list of supported Zebra printers, visit www.zebra.com/enterpriseconnector.

The label format itself must also be XML-enabled. Zebra already has the 10 label formats that support the 10 default label types in Oracle WMS and MSCA. These pre-formatted XML formats are available from www.zebra.com or via an e-mail to connector@zebra.com.

If additional label formats are needed, users will need to create them with label design software. The recommended designer tool to use is Zebra's ZebraDesigner™ for XML label design software; a demo version is also available from www.zebra.com. No ZPL programming skills are needed to create XML-enabled label formats.

When to Use Each Approach

Neither middleware nor the Zebra direct-connect approach is ideal for all user environments. Each has specific advantages depending on an enterprise's legacy printing system and application management preferences. Zebra recognizes and supports both approaches and will continue to promote its Enterprise Connector Solution when it is deemed a superior alternative to the direct-connect offering.

The Zebra Enterprise Connector converts Oracle XML data streams so they can be recognized by any Zebra ZPL-enabled bar code and RFID printer in the enterprise printing operation. The Zebra Enterprise Connector also provides centralized management and control features that many users find desirable. These features are not unique in the Oracle environment, and Zebra makes this possible using the Enterprise Connector middleware tool, which can be used for bar code printing in an Oracle eBusiness Suite application, beyond Oracle WMS/MSCA.

Zebra's XML-Direct Connect approach is appealing to organizations that want to minimize their bar code printing support requirements and simplify their system architecture. Direct connection eliminates the need for middleware to intervene and process communication between Oracle WMS or MSCA and the printer. It eliminates related support costs and licensing fees. The direct connect approach is simpler to set up and maintain because it requires less configuration and software integration and is recommended for Oracle customers who are printing to 20 or less bar code printers.

Enterprises that use the default label types native to Oracle WMS and MSCA may not even have to design new labels because Zebra provides XML-enabled versions of these label formats on www.zebra.com.

Guidelines for when each approach is advantageous are summarized in the following table.

CONDITIONS	ZEBRA DIRECT-XML CONNECT	ZEBRA MIDDLEWARE-XML CONNECT
We intend to grow up to 20 Zebra barcode printers, with no additional XML requirements from Oracle WMS/MSCA. Which solution is recommended?	●	
We intend to grow beyond 20 printers, with the flexibility for additional XML requirements from Oracle, Which solution is recommended?		●
Beyond Oracle WMS/MSCA, which solution can we leverage as one consistent and repeatable barcode solution, shared across other Oracle Application using XML?		●
Is the Zebra Enterprise Connector solution certified by Oracle?	●	●
Can I add additional logic to my XML data stream before printing the barcode labels?		●
Do you charge a per printer seat license?	**No**	**No**
Can we deploy & evaluate the solution as CRP pilots before we incur any software license cost?	●	●
Do you provide the seeded label formats for Oracle WMS?	●	●
Do you support backwards compatibility for Oracle R11 and release 12?	●	●
Can we use this one solution for RFID and barcode labeling to leverage printer's native fonts/barcodes?	●	●
Does the solution run directly on a UNIX/LINUX base system, eliminating the need for Windows Middleware hardware?	**N/A**	●

Conclusion

Zebra's middleware ZebraLink Enterprise Connector Solution and Zebra XML Direct connection represents an alternative choice for bar code printing in the Oracle environment, and a Zebra-centric solution is the optimal choice for most Oracle WMS/MSCA implementations. Besides understanding the technical requirements of each approach, organizations need to analyze their support, software development, and architecture strategies to understand which approach is best for them.

Zebra offers solutions to our customers in order to make our printer products easy to use and easy to integrate within the enterprise, and will continue to work with our partners to provide solutions for a variety of enterprise bar code printing activities.

With the full Zebra suite of label design, XML transformation and printer management solutions, your business can achieve simple, quick rollout to distribution centers, the supply chain and warehouses. The result is expandability to an unlimited number of printers without added expenses, exceptional reliability, and improved operational efficiency.

Visit www.zebra.com to learn more about Zebra printers, labeling software, connectivity and support options and integration partners.

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